002TOT" 58288960

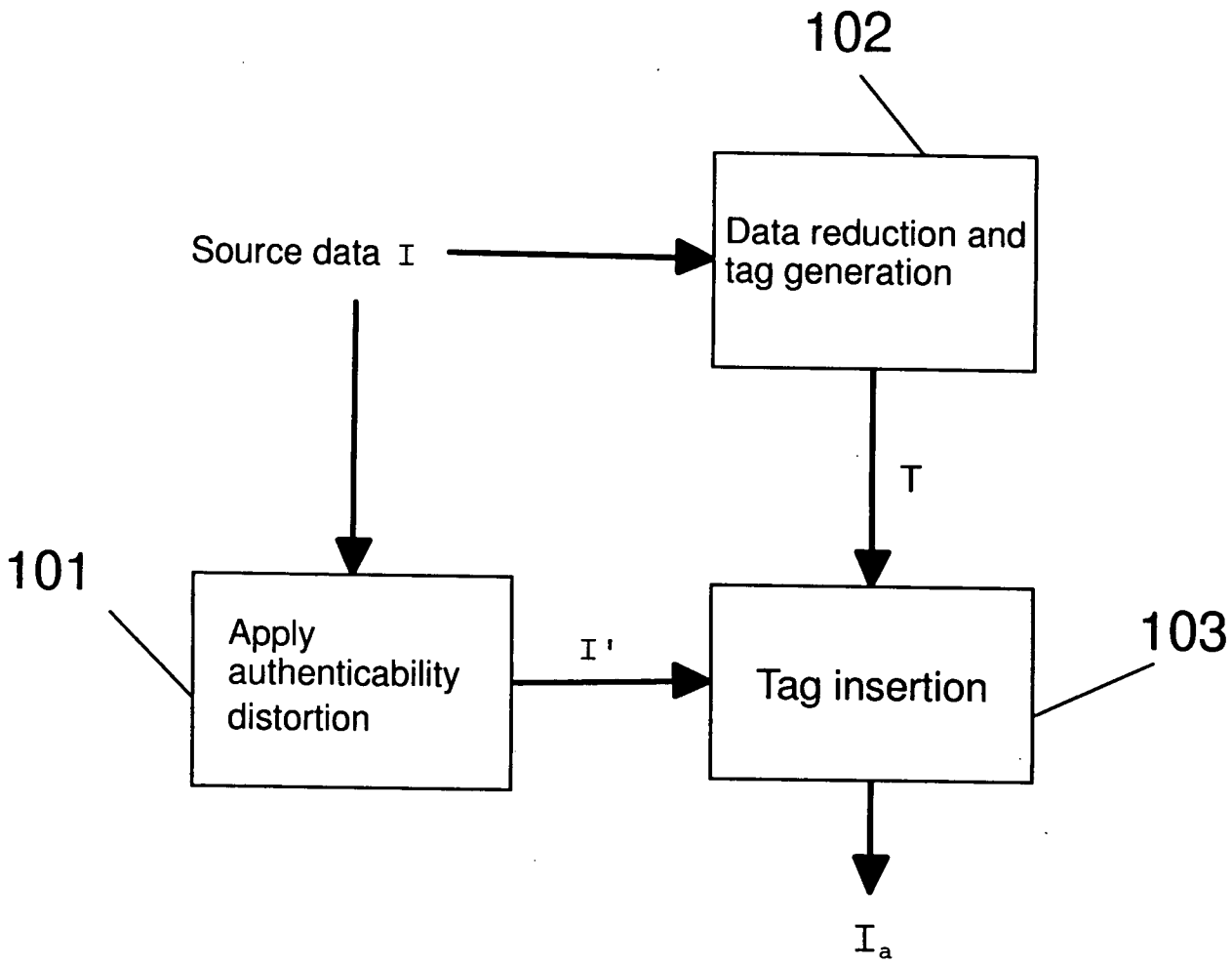


Figure 1a

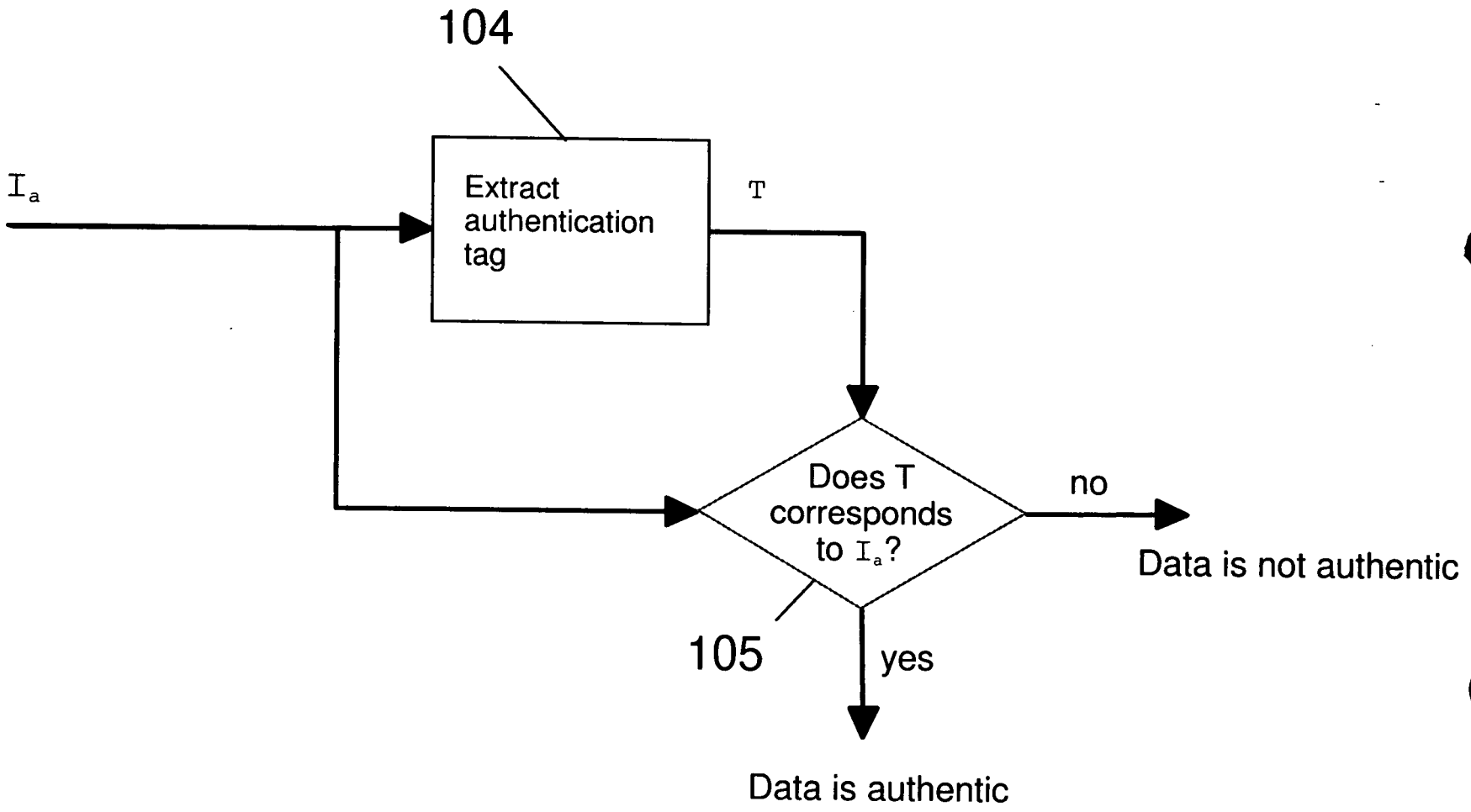

104
I_a
Extract authentication tag
T
Does T corresponds to I_a?
no
Data is not authentic
105
yes
Data is authentic

Figure 1b

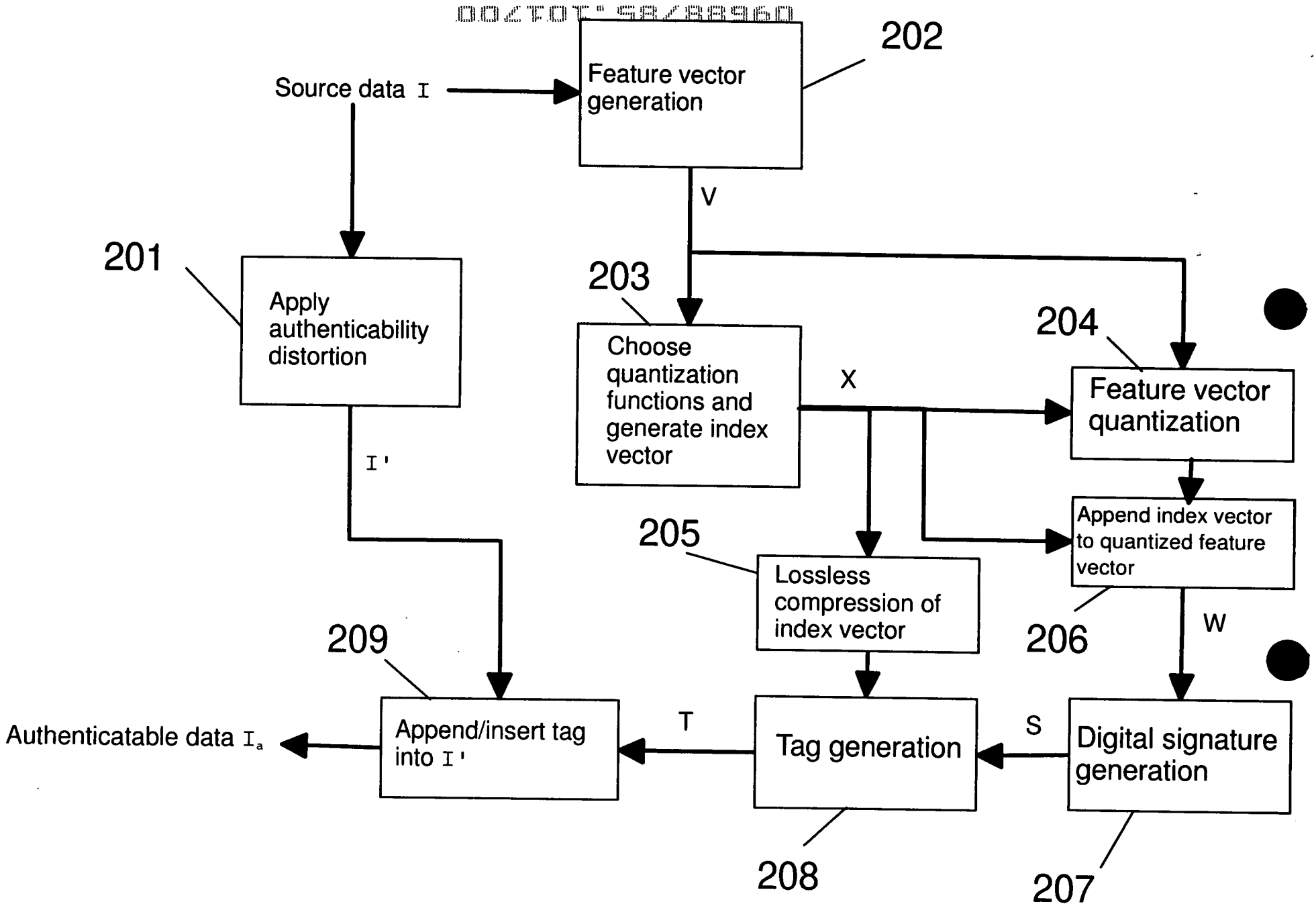

Source data I
Feature vector generation
202
V
201
Apply authenticability distortion
203
Choose quantization functions and generate index vector
X
204
Feature vector quantization
I'
Append index vector to quantized feature vector
205
Lossless compression of index vector
206
W
209
Authenticatable data I_a
Append/insert tag into I'
T
Tag generation
S
Digital signature generation
208
207

Figure 2a

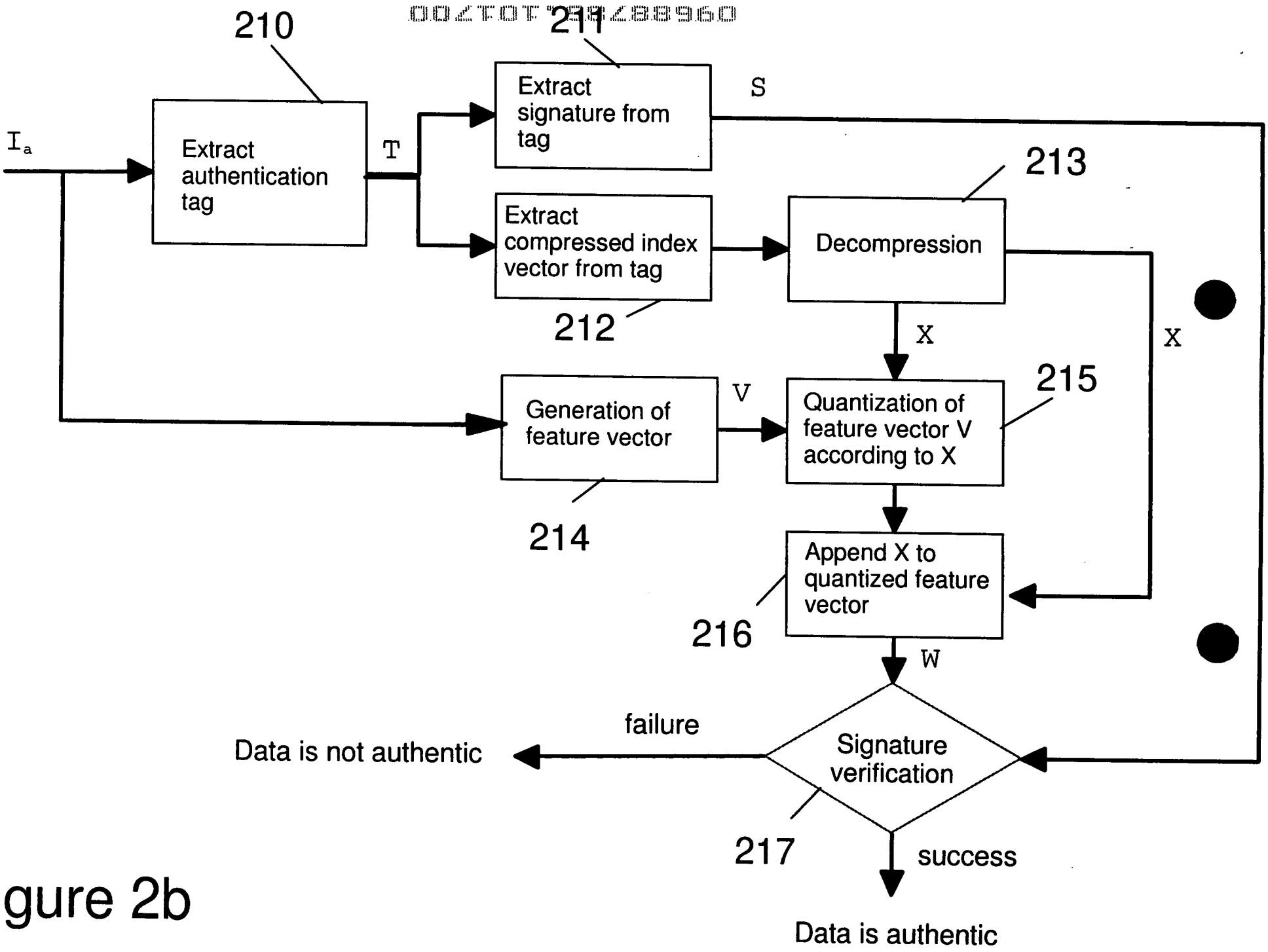

210
211
Extract signature from tag
S
I_a
Extract authentication tag
T
213
Extract compressed index vector from tag
Decompression
212
X
X
215
Generation of feature vector
V
Quantization of feature vector V according to X
214
Append X to quantized feature vector
216
W
failure
Data is not authentic
Signature verification
217
success
Data is authentic

Figure 2b

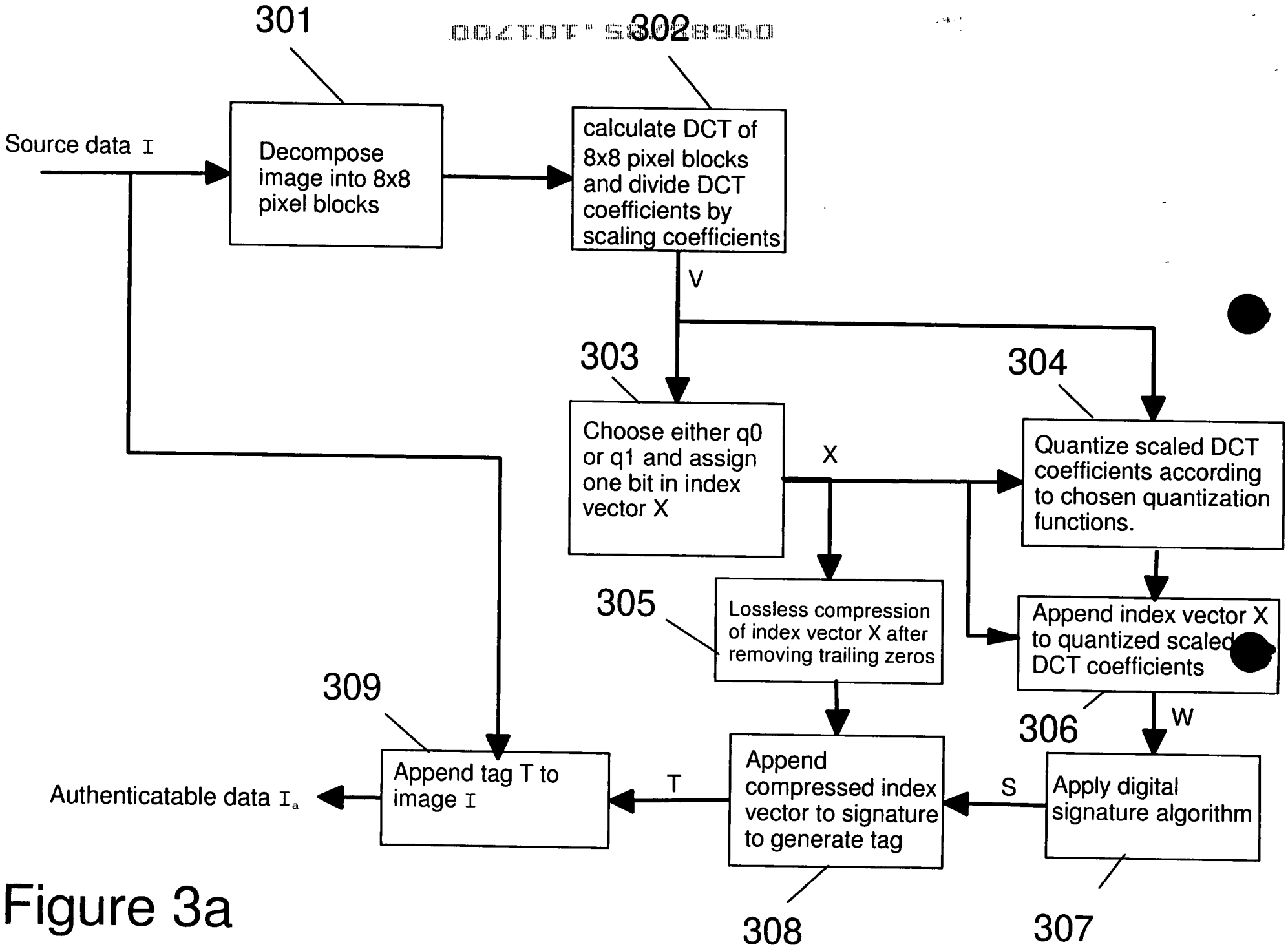

301
302
Source data I
Decompose image into 8x8 pixel blocks
calculate DCT of 8x8 pixel blocks and divide DCT coefficients by scaling coefficients
V
303
304
Choose either q0 or q1 and assign one bit in index vector X
X
Quantize scaled DCT coefficients according to chosen quantization functions.
305
Lossless compression of index vector X after removing trailing zeros
Append index vector X to quantized scaled DCT coefficients
309
306
W
Append tag T to image I
T
Append compressed index vector to signature to generate tag
S
Apply digital signature algorithm
Authenticatable data I_a
308
307

Figure 3a

DOCTOT "6288960

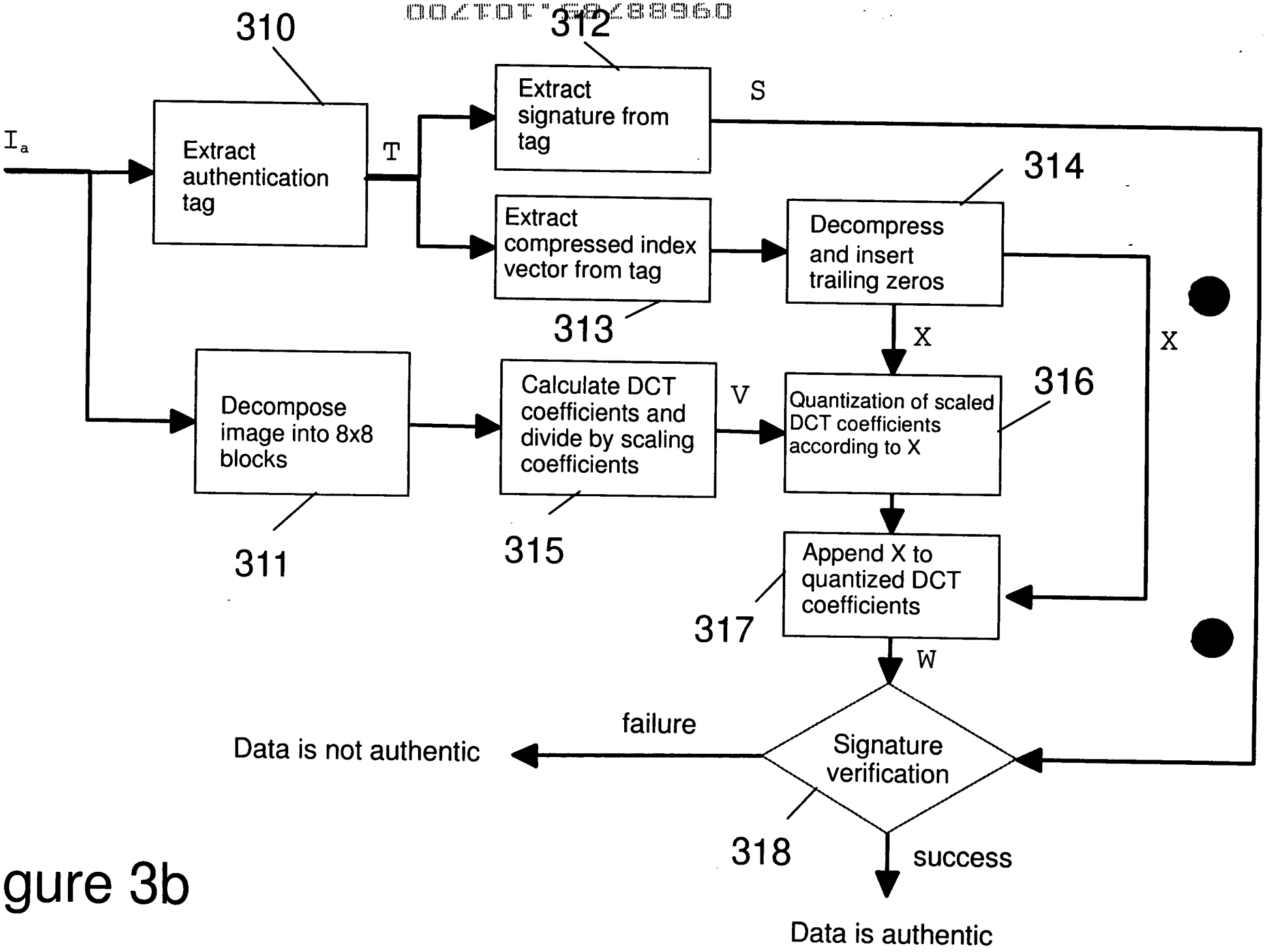


Figure 3b

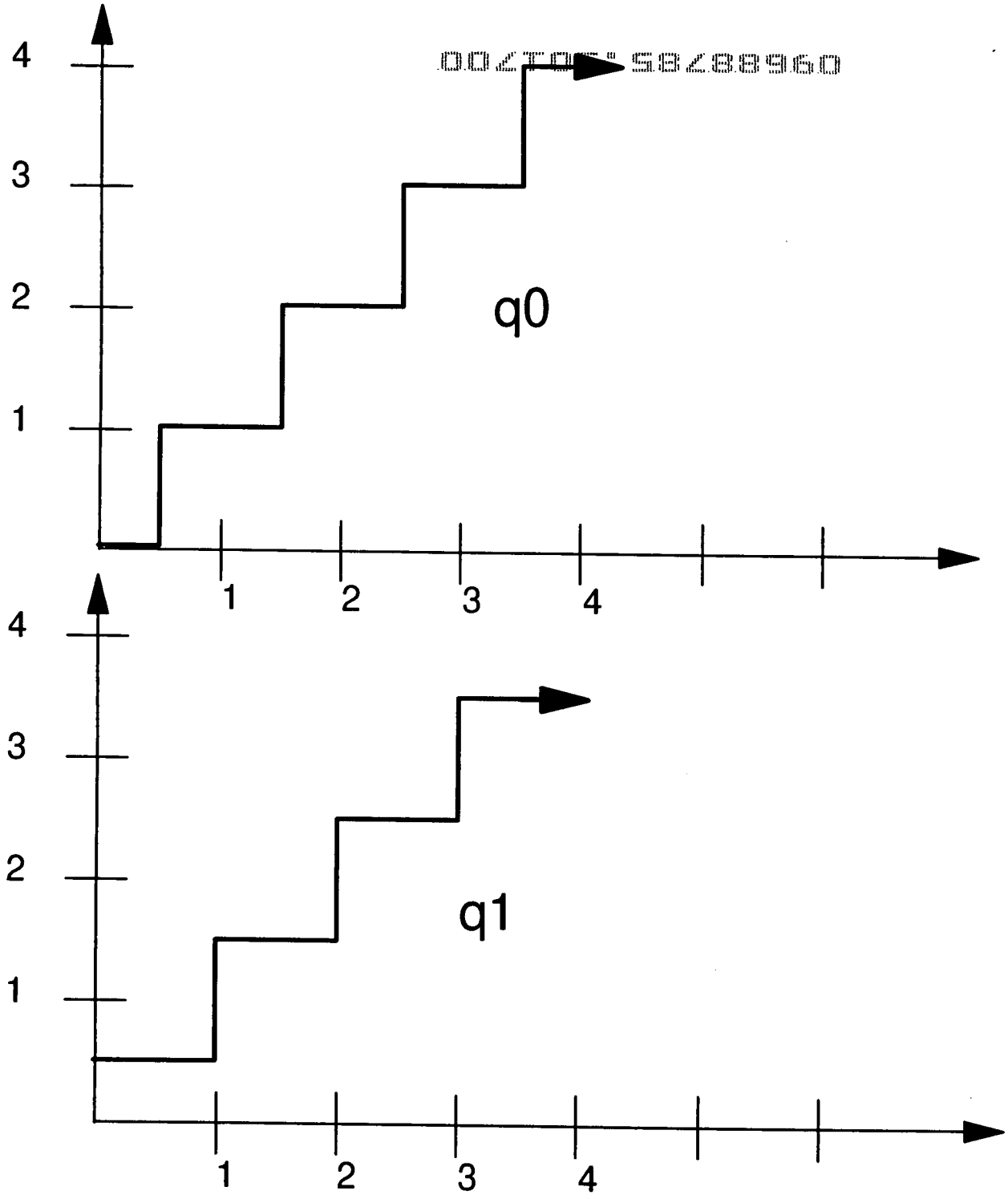
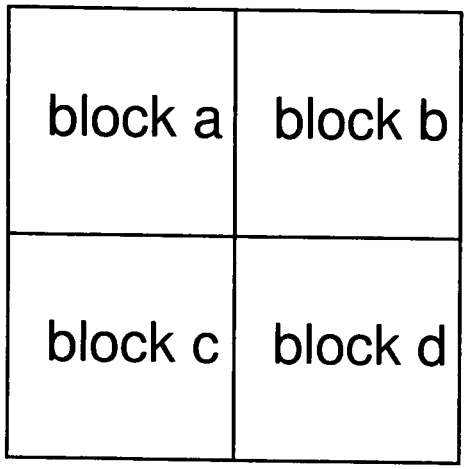
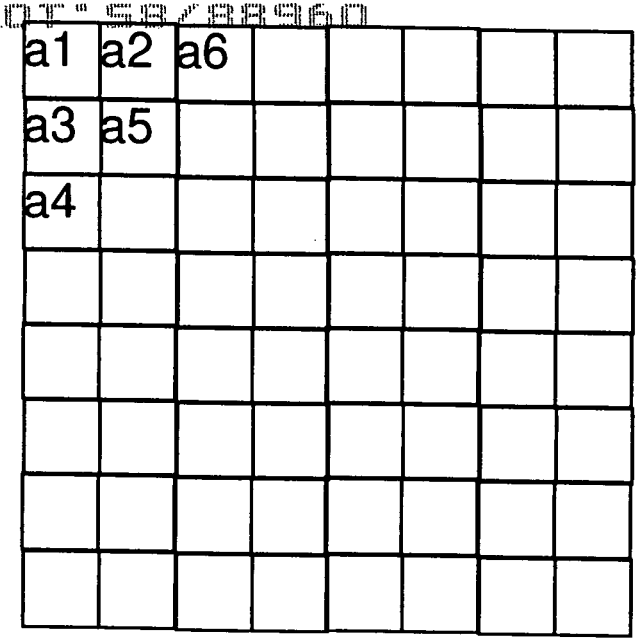


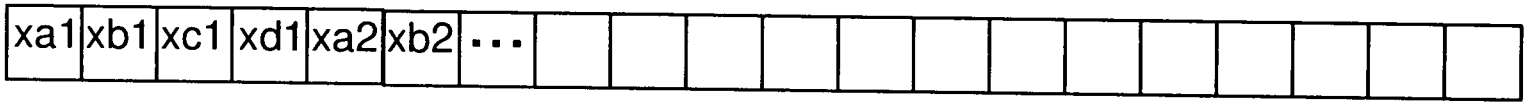
Figure 4



Image



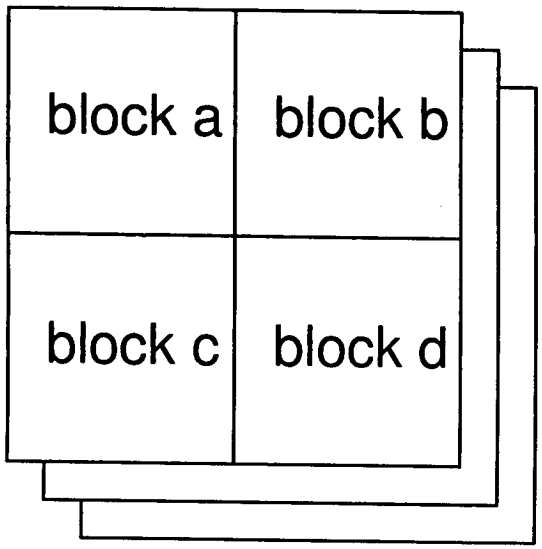
DCT coefficients of block a



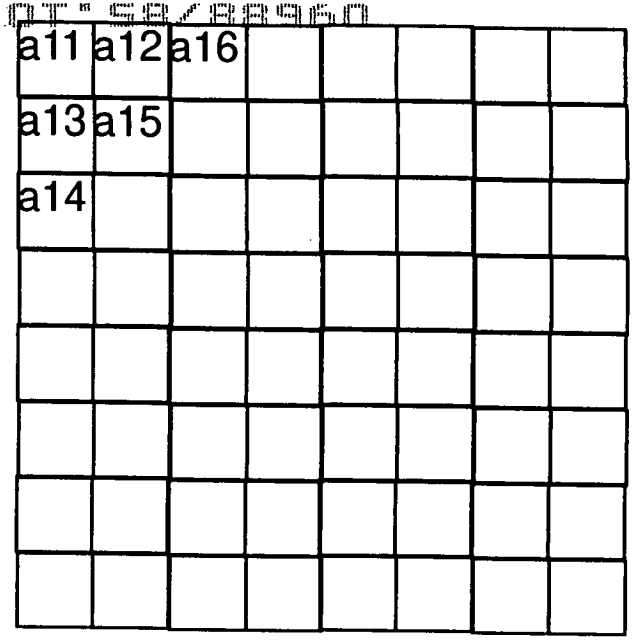
Bits of index vector X

aj is the j-th DCT coefficient of block a.
xaj is the bit corresponding to the quantization function chosen for DCT coefficient aj.

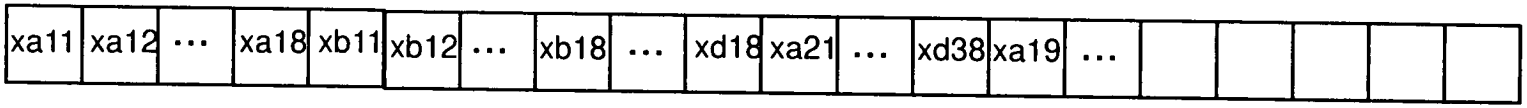
Figure 5a



Color image



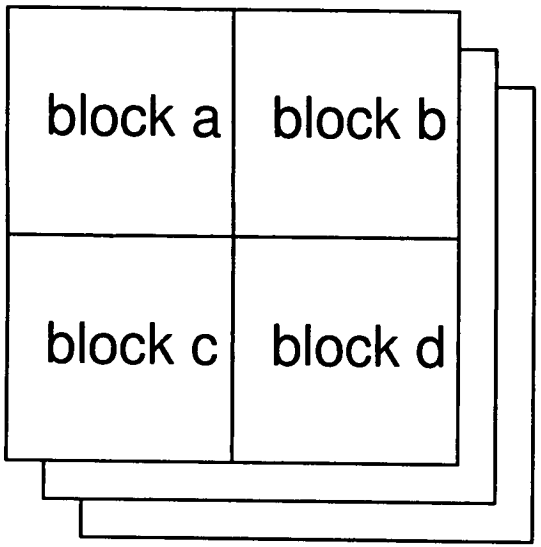
DCT coefficients of block a of color plane 1



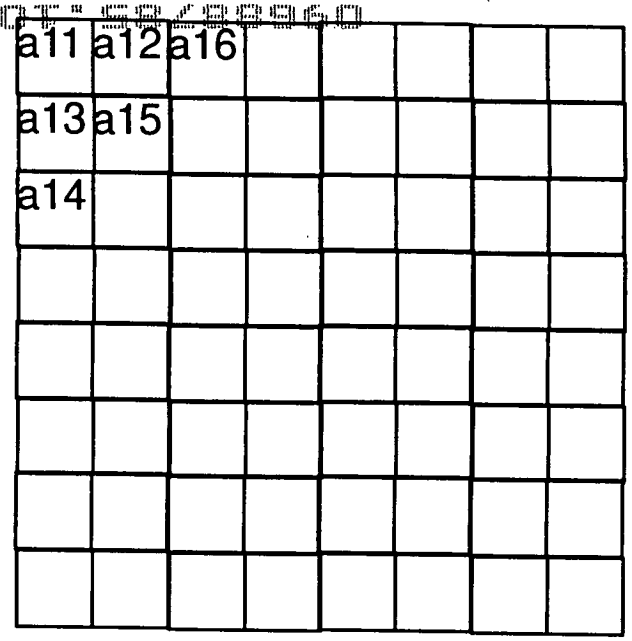
Bits of index vector X

aij is the j-th DCT coefficient of block a of color plane i.
xaij is the bit corresponding to the quantization function chosen for DCT coefficient aij.

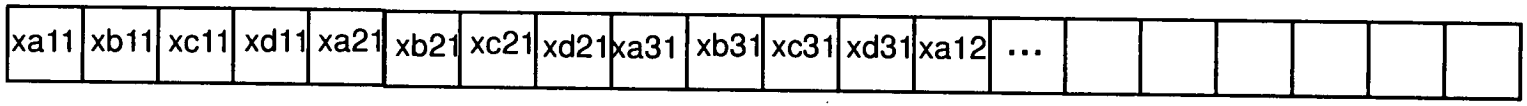
Figure 5b



Color image



DCT coefficients of block a of color plane 1



Bits of index vector X

aij is the j-th DCT coefficient of block a of color plane i.
xaij is the bit corresponding to the quantization function chosen for DCT coefficient aij.

Figure 5c

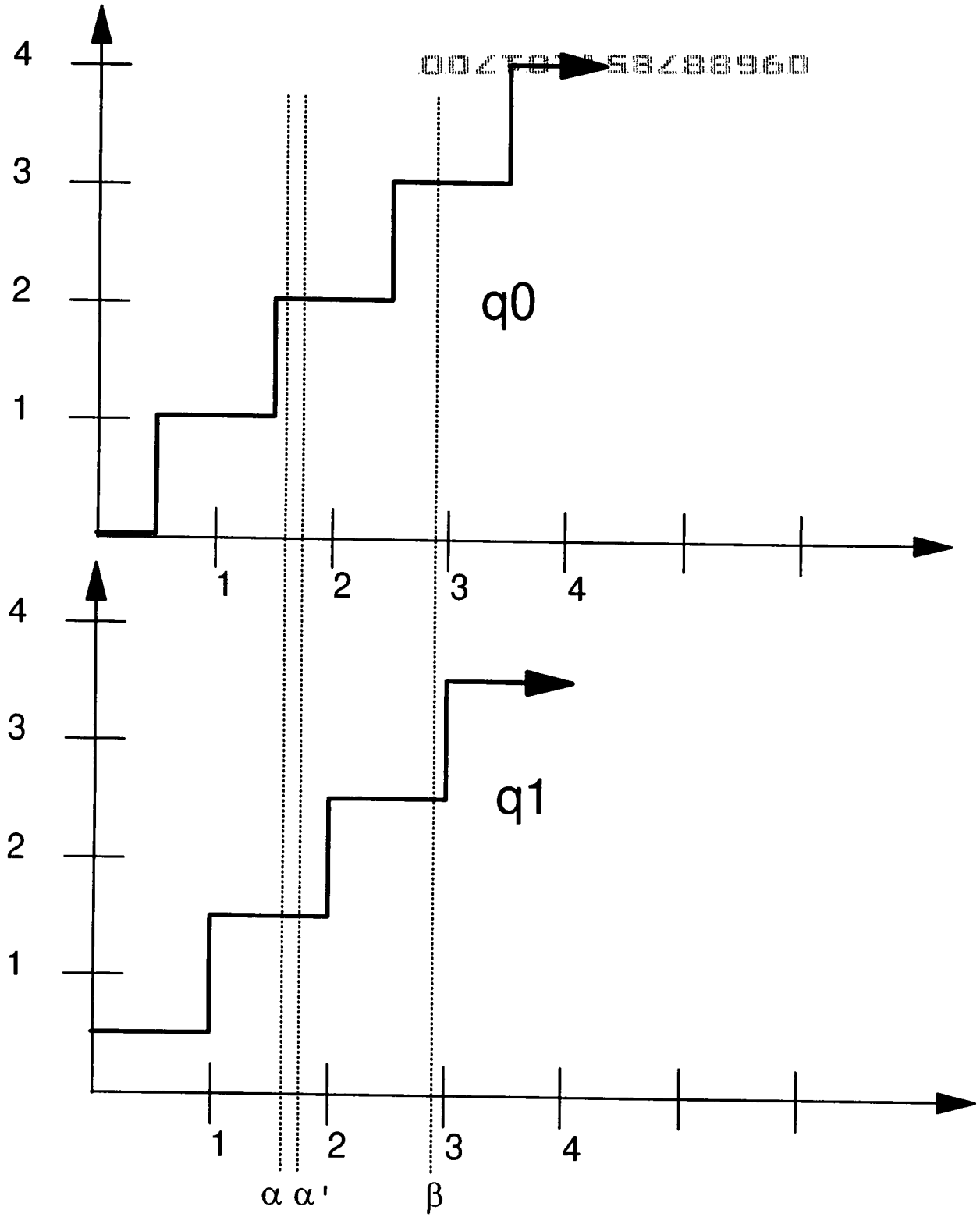


Figure 6

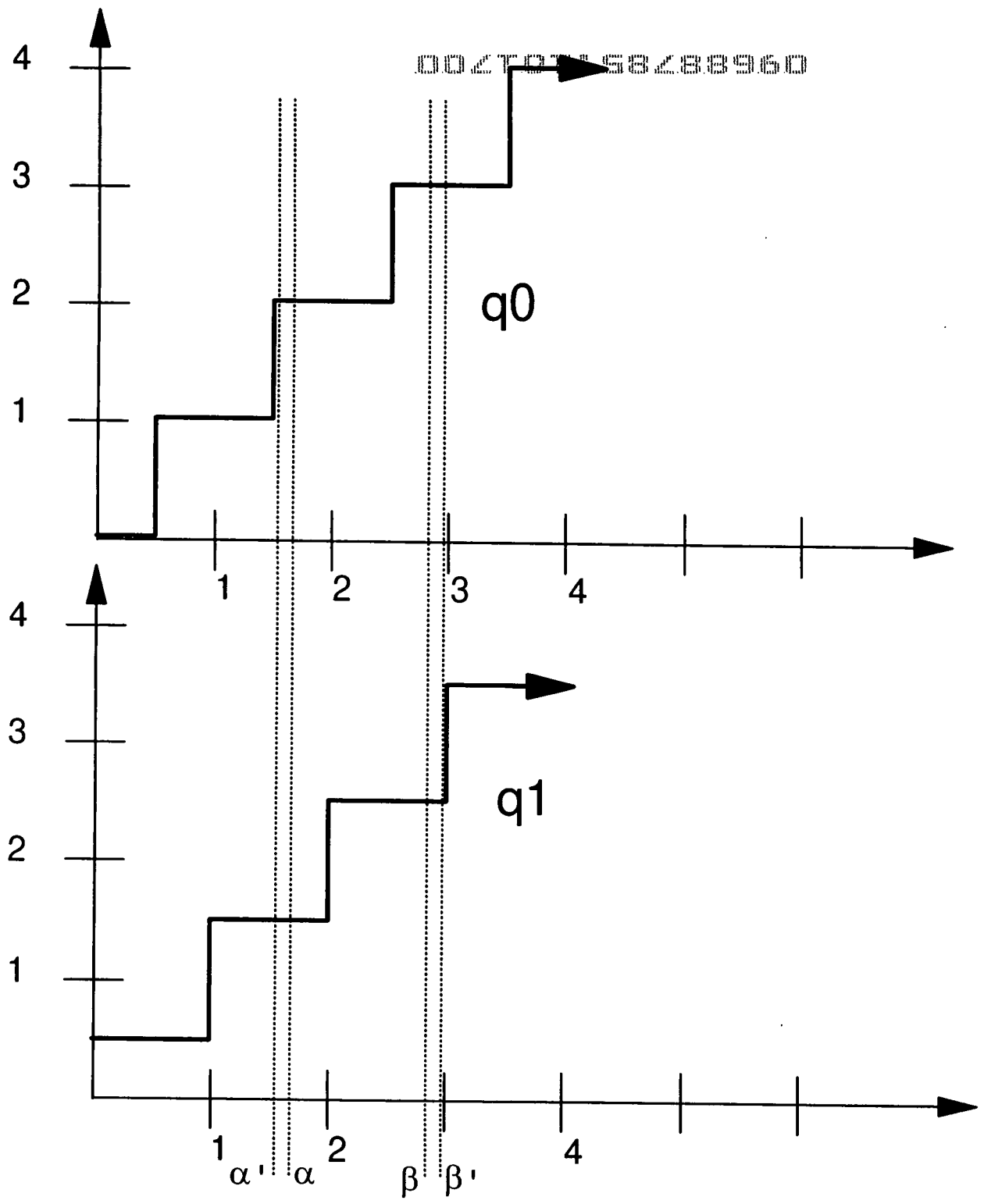


Figure 7

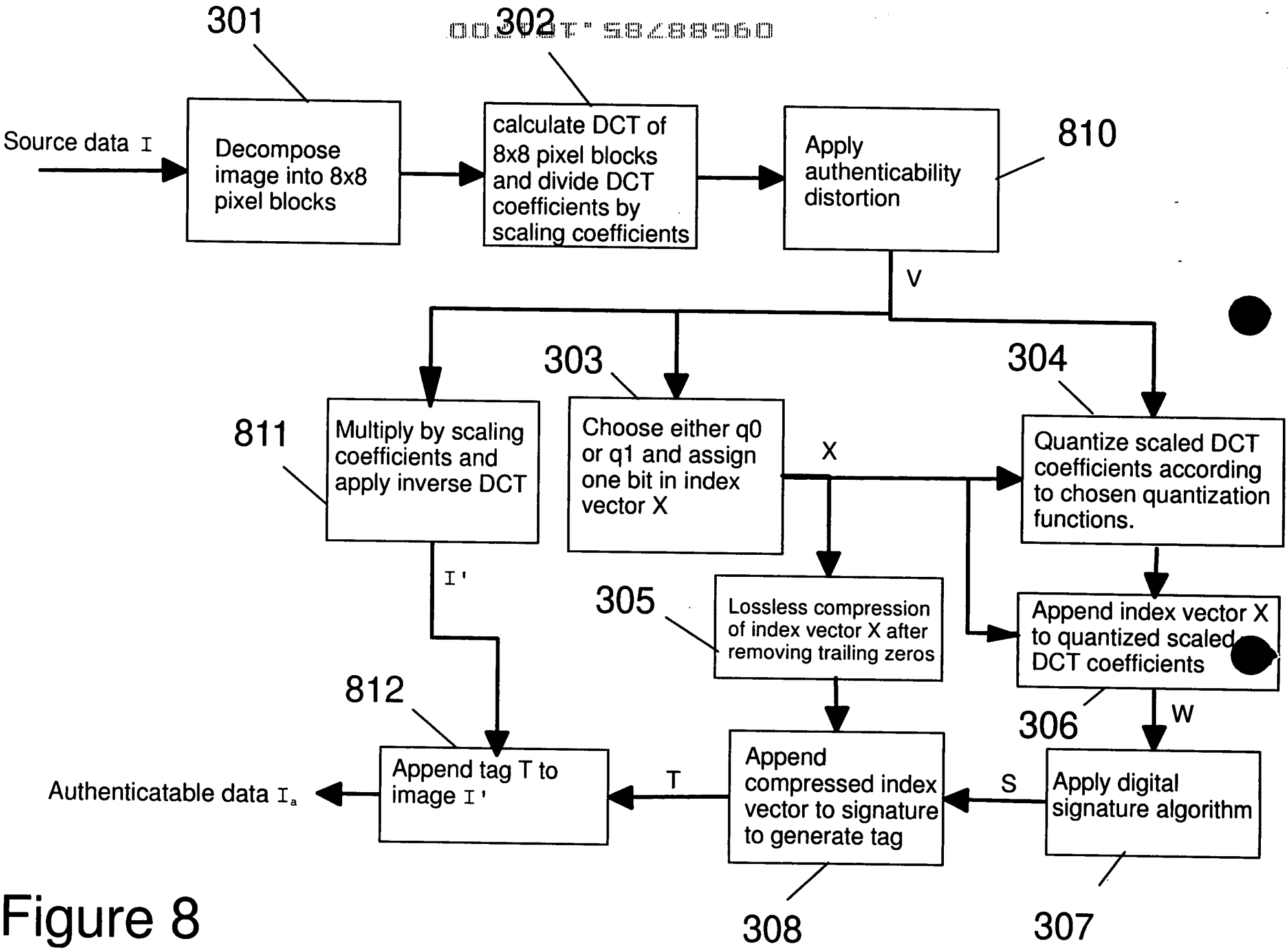

301
302
Source data I
Decompose image into 8x8 pixel blocks
calculate DCT of 8x8 pixel blocks and divide DCT coefficients by scaling coefficients
Apply authenticability distortion
810
V
303
304
811
Multiply by scaling coefficients and apply inverse DCT
Choose either q0 or q1 and assign one bit in index vector X
X
Quantize scaled DCT coefficients according to chosen quantization functions.
I'
305
Lossless compression of index vector X after removing trailing zeros
Append index vector X to quantized scaled DCT coefficients
812
306
W
Append tag T to image I'
T
Append compressed index vector to signature to generate tag
S
Apply digital signature algorithm
Authenticatable data I_a
308
307

Figure 8

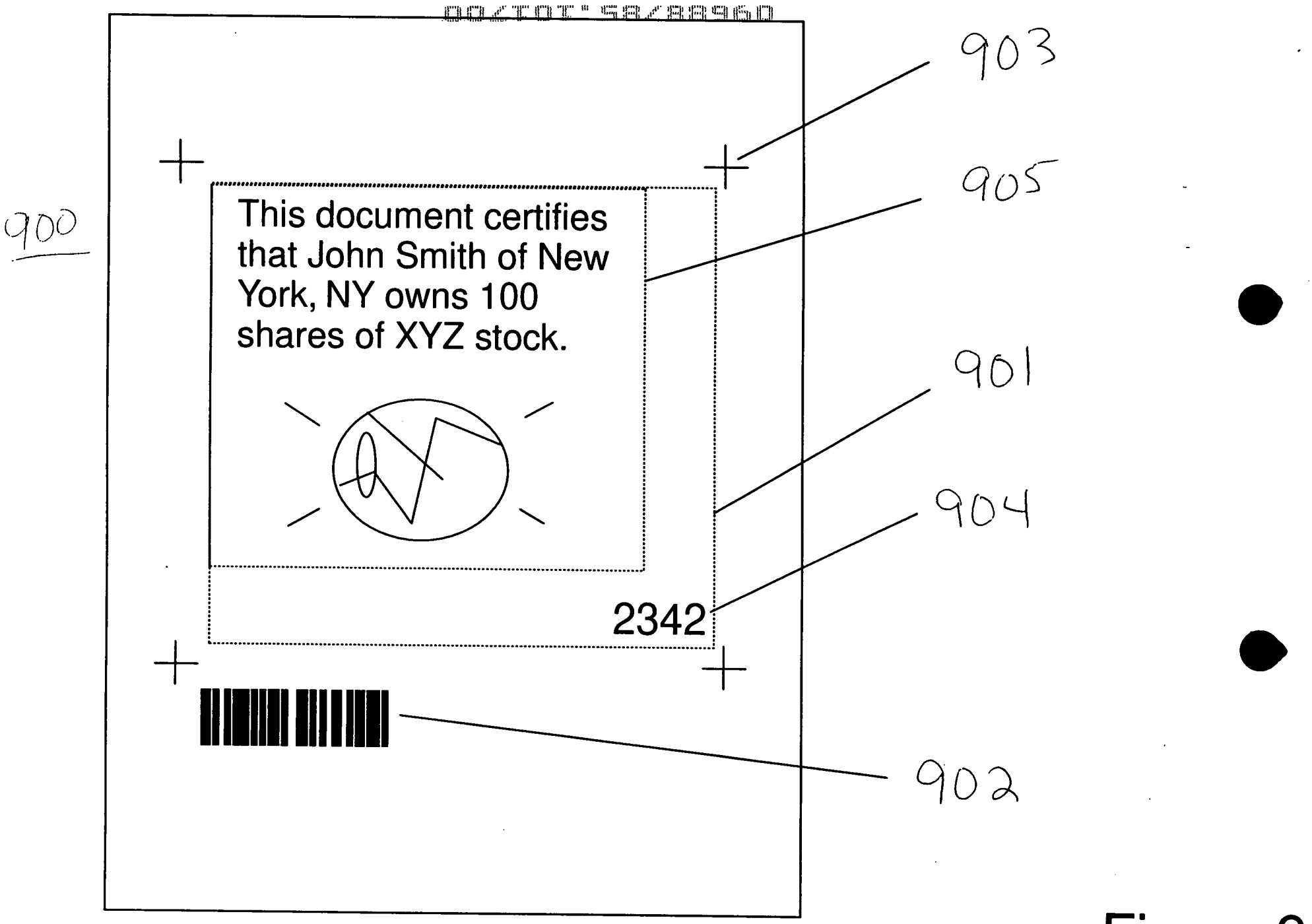

900
This document certifies that John Smith of New York, NY owns 100 shares of XYZ stock.
2342
903
905
901
904
902

Figure 9

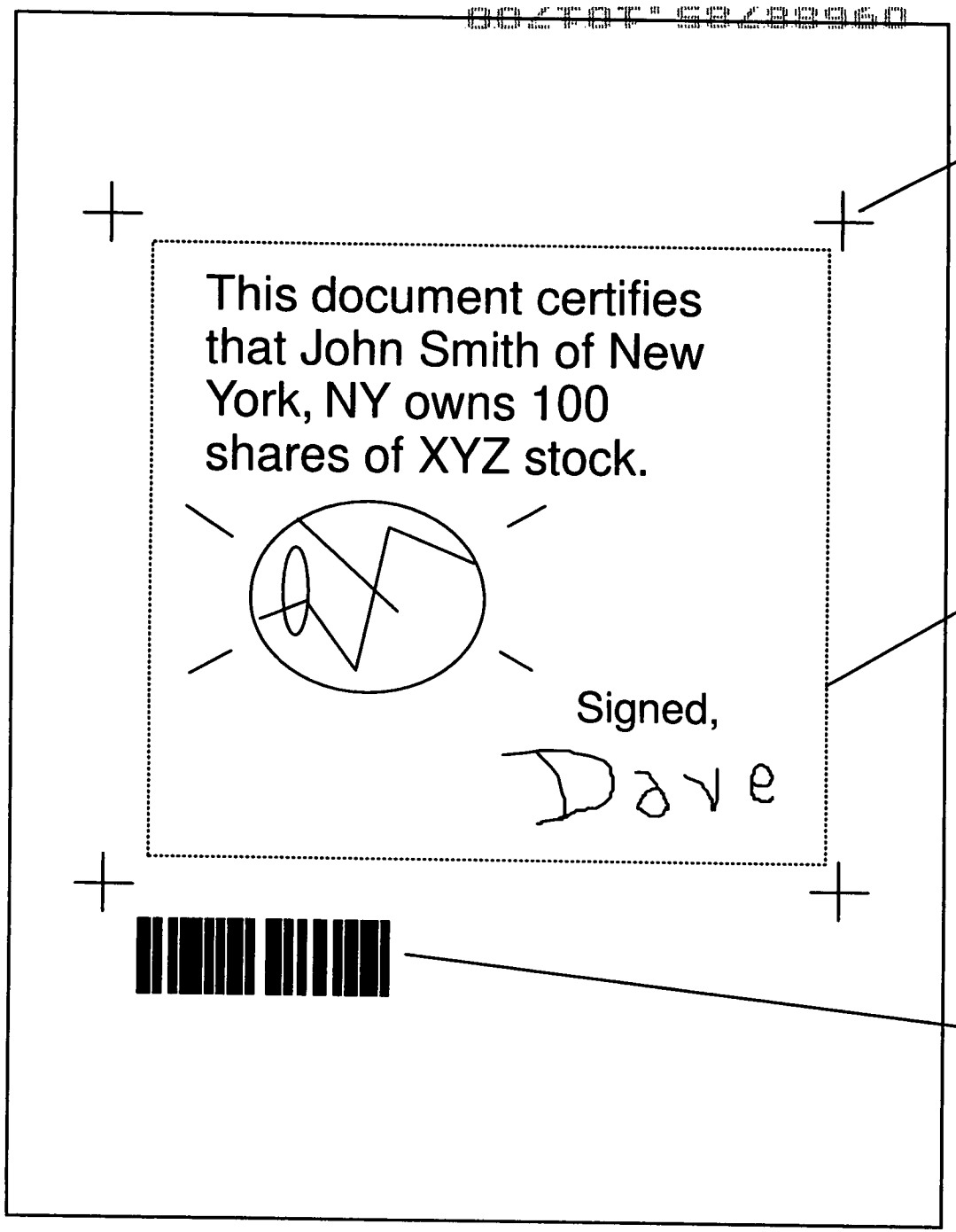

This document certifies that John Smith of New York, NY owns 100 shares of XYZ stock.
Signed,
Dave
1003
1001
1002

Figure 10

00ZTOT"58Z889bO

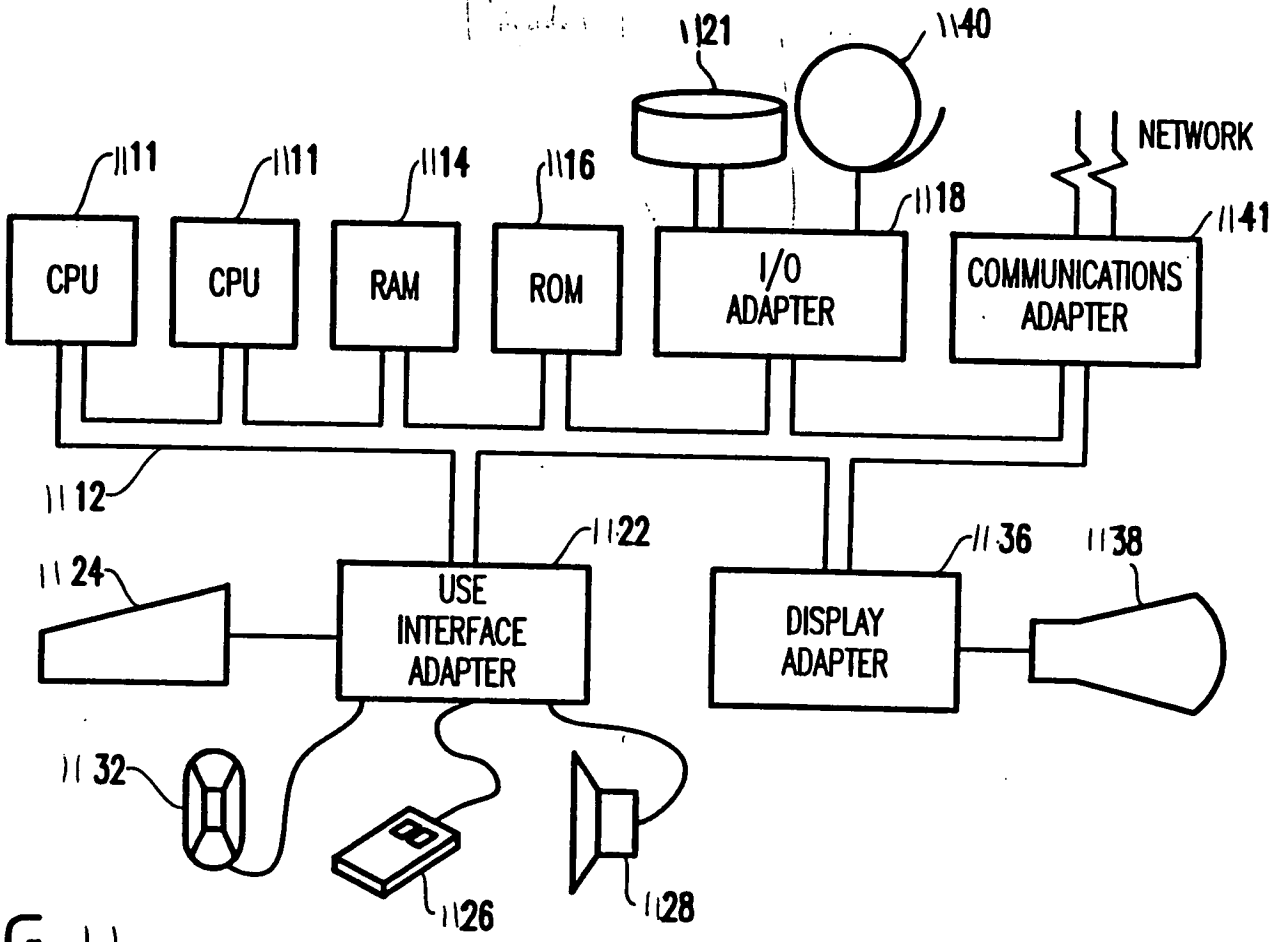


FIG. 11

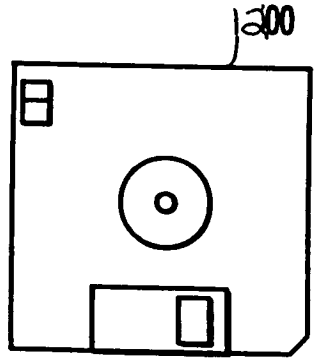


FIG. 12